CONTINUOUSLY CONDUCTIVE UNIPOLAR CANNULA FOR ANESTHESIA

The invention concerns a continuously conductive unipolar cannula for anesthesia.

A continuously conductive unipolar cannula for anesthesia produced by the company Pajunk GmbH, D-78187, Geisingen, Germany is known, which has an electrically conductive cannula tube, the tube having an electrically insulated outer covering which extends from the proximal body part out to the distal tip of the cannula tube and leaves exposed the distal tip in its distal end area. In the area of the proximal body part, the cannula tube is electrically contacted with a connector, which can be connected to an electro-stimulation device via a socket or jack. The distal tip of the cannula tube is either provided with a facet cut or is designed as a so-called Sprotte tip as disclosed in DE 30 20 926 C2.

In this known unipolar cannula, the connector for electro-stimulation and an injection hose for the anesthetic are provided introduced axially parallel next to each other in the proximal end face of the body part of the cannula tube. The unipolar cannula can be placed exactly in the nerve sheath with its distal tip using electro-stimulation, in order to then be able to apply the anesthetic via the feed hose precisely on the nerve.

In the continuously conductive anesthesia, a catheter is placed in the nerve sheath, in order to be able to introduce anesthetic over a longer period of time. In order to introduce a catheter

using the known unipolar cannula, a plastic introducer cannula is pulled over the cannula tube, which is placed under electro-stimulation by means of the unipolar cannula. As soon as the plastic introducer cannula is in place, the unipolar cannula is withdrawn and then the catheter can be introduced through the plastic introduction cannula.

It is further known from DE 36 43 235 C1 and DE 37 12 869 C2, to design a cannula with Sprotte-tip, such that through this cannula itself a catheter can be introduced in place. For this, a ramp or guide is formed in the inside of the distal tip of the cannula tube, which leads to a side outlet opening. A catheter introduced proximally in the cannula tube is led out of the cannula tube via this ramp through the side outlet opening. This cannula is suitable for the placement of a catheter without a supplemental introducer cannula. An electro-stimulation is, however, not possible with this known cannula. Accordingly, this cannula is not provided with an electrical connection for electro-stimulation.

The invention is concerned with the task, of providing a unipolar cannula for the continuous conduction anesthesia, which through simple construction and simple operation unites the placement of the catheter with the advantage of the electro-stimulation.

This task is inventively solved by the unipolar cannula with the characteristics of Claim 1.

Advantageous embodiments and further developments of the invention are set forth in the dependent claims.

The inventive unipolar cannula can be placed or located with the help of electrical nerve stimulation. The outer insulating covering of the cannula tube, which leaves only a very small, almost pinpoint area of the tip free, makes possible an extraordinarily precise placement of the tip. The unipolar cannula can itself be used for the guided introduction of the catheter, for which the body part positioned at the proximal end of the cannula tube exhibits an introduction opening, which leads axially aligned into the cannula tube. The connection for electro-stimulation is introduced through the side of the body part and contacts the outside of the electrically conductive cannula tube. The connection thus does not impede or constrict therewith the axial inlet opening of the body part. After the placement of the unipolar cannula with the help of electro-stimulation, the catheter can be introduced through the cannula tube, without any requirement that the position of the unipolar cannula must be changed or other measures be taken. Preferably, a releasable or removeable connection is formed with the body part at the introduction opening, preferably a luer-lock connection. At this connection, an injection hose can be connected if desired, for injection of an initial or a short duration anesthetic. Likewise, a needle can be connected to the releasable connection, for injection of an anesthetic or also for fluids for aspiration for position control. The possibility of using the body part both for the alternative connection of an injection hose or a needle as well as for introduction of the catheter makes the unipolar cannula extremely versatile. This

versatility is achieved using an extremely simple and economical design. The manipulation of the unipolar cannula is likewise extremely simple, since the cannula can be employed without changing the position both for the injection or aspiration as well as for the introduction of the catheter. The axially aligned connection of a needle at the proximal body part makes possible also the carrying out of the nerve block with a one-hand technique.

The needle of the cannular tube can be designed with a facet cut, so that the outlet opening is formed by the diagonal cut surface slanted with respect to the cannula axis. In this embodiment, the catheter exits out of the distal needle axially aligned with the cannula tube. This design is suitable, for example, for the continuous blockage of the interior ischiadicus, for the positioning of a distal ischiadicus catheter, or for the seating of a psoas compartment block.

Likewise, the distal tip of the cannula tube can be designed as a Sprotte-tip wherein the catheter, which is introduced through the cannula tube, is guided through the side outlet openings behind the tip by means of a ramp. The catheter thereby exits at an angle of approximately 30° to the cannula axis. This is of advantage in the anesthetic technique, in which a penetration or piercing essentially parallel to the nerve is not possible. This design of the unipolar cannula is employed, for example, in the interscalenary plexus blockage, the vertical-infraclavical plexus blockage, the ischiadicus blockage, and the blockage of the nervus suprascapularis.

In the following, the invention will be described in greater detail on the basis of the embodiments shown in the drawing. There is shown.

Fig. 1 a view of the unipolar cannula in a first embodiment,

Fig. 2 an enlarged vertical section of this unipolar cannula, and

Fig. 3 an axial section corresponding to Fig. 2 of a second embodiment of the unipolar cannula.

Figs. 1 and 2 show a first embodiment of the unipolar cannula.

This cannula includes an electrically conductive cannula tube **10**, which is preferably formed of steel. Depending upon the model, the cannula tube **10** has a length of from 25 to 200mm and a diameter of 0.5 to 1.0mm. In the illustrative embodiment of Figs. 1 and 2, the distal end of the cannula **10** is cut or ground with a facet cut **12** less than 45° to the axis of the cannula tube **10**, so that a distal tip **14** is formed. The outer surface of the cannula tube **10** is covered with an electrically conductive plastic. The covering extends from the proximal end of the cannula tube **10** out to the distal tip **14** and leaves free only the distal end area **16** of the tip **14** with a length of maximally approximately 1mm, in which the metal of the cannula tube **10** is exposed.

The proximal end of the cannula tube **10** is positioned co-axially in a body part **18** of plastic and is adhered therewith via a

hardening adhesive **20**. The body part **18** exhibits an essentially cylindrical shape through which a borehole extends co-axially. In the distal area, the inner diameter of this borehole corresponds to the outer diameter of the cannula tube **10** seated in this borehole. The cannula tube **10** projects with its proximal end axially approximately into the middle of the body part **18**. In the area of the proximal end of the cannula tube **10**, the inner diameter of the body part **18** widens, so that between the inner wall of the body part **18** and the cannula tube **10** a ring gap remains free. In the area of this ring gap, a cylindrical connection socket or jack **22** in electrically conductive contact is pressed against the metallic cannula tube **10**. A conductive wire **24** of a stranded conductor **26** is soldered to this metallic connection junction **22**. The non-insulated wire **24** runs in the area in which it is soldered with the connection junction **22** axially parallel to the cannula tube **10** in the distal direction. The insulated stranded conductor **26** then bends away at a right angle from this axially parallel direction and extends radially through the body part **18** towards the outside. The opening of the body part **18**, through which the connection stranded conductor **26** exits, is filled with a hardening adhesive **28**.

The ring gap between the inner wall of the bore of the body part **18** and the proximal end of the cannula tube **10** with the connection socket or jack **22** and the wire **24** is filled with a hardening plastic **30**.

The plastic **30** forms an inlet funnel **32**, which connects co-axially to the proximal end of the cannula tube **10** and widens

from the inner diameter of the cannula tube **10** in proximal direction to the diameter of the internal bore of the body part **18**. Connected with this introduction funnel **32** in the axially proximal direction is the section of the body part **18** designed as luer-lock connection **34**, which axially aligns with the cannula tube **10**.

On the free end of the stranded connector **26**, a plug-in connector junction or jack **36** is provided, with which the unipolar cannula can be plugged into an electrical nerve stimulator. The nerve stimulator sends out electrical voltage impulses of a few milliamps, which are conducted to the exposed distal end area **16** of the tip **14** through the stranded conductor **26**, the wire **24**, the connector junction **22**, and the cannula tube **10**, in order to emits an electrical nerve stimulation for localization of the distal tip **14**.

On the outer circumference of the body part **18**, grip flanges **38** are provided. An indicator notch **40** in one of the grip flanges **38** makes it possible to recognize the angled position of the facet cut **12**.

In order to place the unipolar cannula, this is connected by means of the plug-in connector **36** to a nerve stimulator. The cannula tube **10** is stuck into the nerve sheath via the cut tip **14**, whereby the respective position of the tip **14** can be controlled via the electro-stimulation. If the distal tip **14** of the cannula tube **10** is in place, then an injection hose can be connected to the Luer-lock connection **34** by means of a Luer-lock connector **42**, in order to introduce an anesthetic via the

cannula tube **10**. Alternatively, a needle can be connected to the Luer-lock connection **34** in order to control the position of the distal tip **14** by aspiration or in order to inject an anesthetic through this tip. If a catheter is to be placed for a long tern anesthesis, so this is - in certain cases after disconnection of the injection hose or the needle - axially introduced through the Luer-lock connection **34**, whereby the inlet funnel **32** of the catheter tip leads into the cannula tube **10**. The catheter tip passes axially out through the open distal end of the cannula tube **10** and is brought into the desired position. If the catheter is in place, so the unipolar cannula can be pulled out from the catheter from the back, whereby the catheter remains in its position.

Fig. 3 shows a further embodiment of the unipolar cannula. As far as this corresponds with the previously described embodiment, the same reference numbers are employed and reference is made to the above description.

In contrast to the embodiments of Figs. 1 and 2, the distal tip **14** of the unipolar cannula of Fig. 3 is designed as a Sprotte-tip, as this is described in DE 36 43 235 C1. The distal tip **14** is designed as a closed-arched conical needle. Along the side behind the conical opening there is an outlet opening **44**. The tip **14** is filled with a hardenable plastic **46**, so that a ramp is formed on the inside of the cannula tube **10**, which deflects the catheter tip out of the axial direction as it is slid distally towards the front in the cannula tube **10**, so that the catheter exits from the side of the outlet opening **44** at an angle of approximately 30° to the axis of the cannula tube **10**. The

cannula tube **10** is covered with insulation up to the conically-arched tip **14** so that also here only a distal end area **16** of the tip **14** with a maximal length of 1mm is exposed.

REFERENCE NUMBER LIST

10	Cannula tube
12	Facet cut
14	Distal tip
16	End area
18	Body part
20	Adhesive
22	Junction Box
24	Wire
26	Multi-stranded conductor
28	Adhesive
30	Plastic
32	Inlet funnel
34	Luer-lock connection
36	Plug-in connector
38	Grip flange
40	Marking groove
42	Luer-lock connector
44	Outlet opening
46	Plastic ramp